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Antiferromagnetism in iron-based superconductors: Magnetic order in the model of delocalized electrons

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Abstract

A theoretical analysis of the magnetic ordering mechanisms in parent ferropnictides (FPs) was investigated. The study takes into account that a ferropnictide remains metallic when it resides a magnetic state, and relies on a model that describes AFM order in terms of the spin density wave (SDW) for itinerant electrons. The reason is that optical conductivity measurements reveal a transfer of spectral weight from the Drude peak to the middle of the infrared peak, in accordance with the itinerant electron model that leads to AFM order. The SDW order parameter also becomes finite when the Fermi surface disappears. This results from the fact that an electron-hole loop formed by α and B fermions is similar to the particle-particle loop because the α and Bband dispersions differ in sign. The calculated Fermi contours, ARPES spectral intensity, and the band dispersion near the Fermi level are consistent with the experimental data.

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